

CONFIDENTIAL

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BUREAU OF LAND MANAGEMENT**

Utah State Office

TECHNICAL REPORT:

PRELIMINARY ASSESSMENT OF THE COAL RESOURCES

IN THE

GRAND STAIRCASE - ESCALANTE NATIONAL MONUMENT

KANE AND GARFIELD COUNTIES, UTAH

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Management Review:

DRAFT

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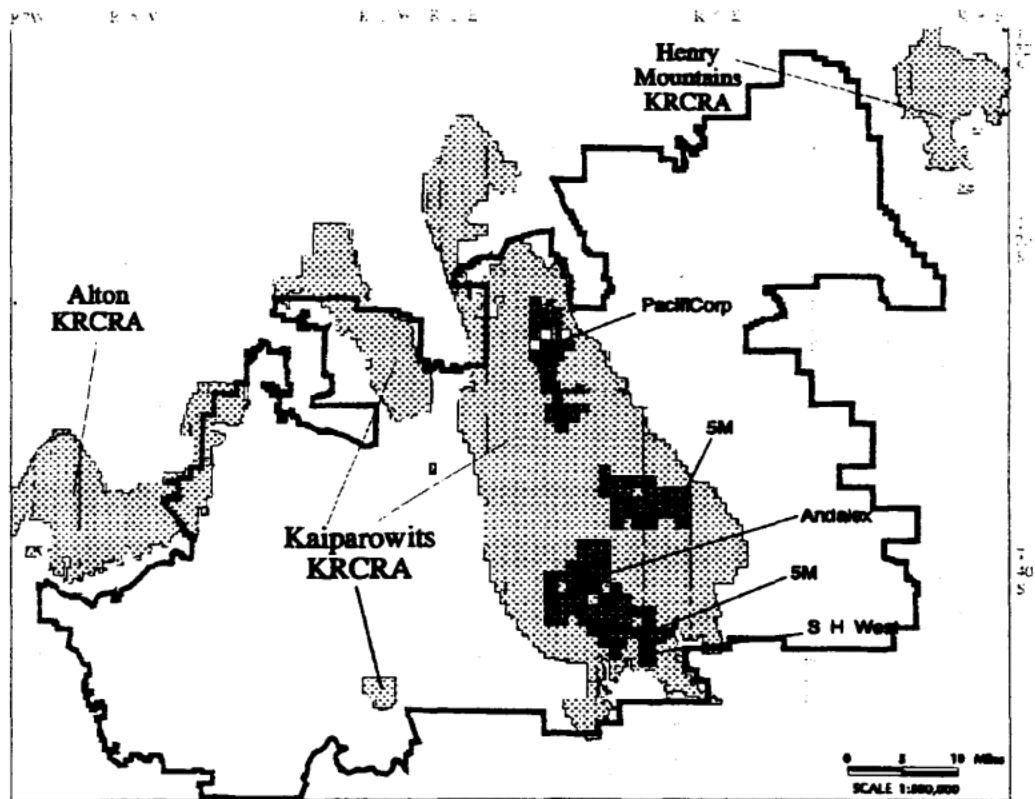
Introduction

On September 18, 1996, President Clinton designated about 1.7 million acres of land in Kane and Garfield Counties, Utah, as the Grand Staircase - Escalante National Monument. The designation of the Monument closed these lands to the further location of mining claims and issuance of any leases for leasable minerals. However, the proclamation designating the monument recognized that mining claimants and mineral lease holders would be able to exercise any valid existing rights they held when the monument was created.











The lands designated in the Monument include most of the Kaiparowits Plateau Coal Field which includes most of the lands formally classified in 1974 as the Kaiparowits Plateau Known Recoverable Coal Resource Area (KRCRA), and a small portion of the Alton - Kanab KRCRA (figure 1). Areas designated as a KRCRA are classified on the basis of information known about the coal resources, as those areas where potentially economical coal deposits might be expected to occur. In the Federal coal leasing program, lands within a KRCRA are evaluated in comprehensive land-use plans required by the Federal Land Policy Management Act for further consideration for leasing. The Kaiparowits Plateau contains one of the largest undeveloped coal resources in the United States. In a report released in October, 1996, the USGS estimated that the Kaiparowits Plateau Coal Field contains over 62 billion tons of in-place coal resources, a little over 44 billion tons of which are within the National Monument. This estimate includes all coal beds at least one foot thick without regard for depth or structural attitude of the coal bed. When the USGS developed this estimate, no effort was made to identify or correlate individual coal beds which might be minable. At the time the monument was created, four entities, S.H. West, 5-M, Pacificorp, and Andalex Resources, held coal leases in the area as shown on figure 1. The leaseholds held by Pacificorp and Andalex Resources had been suspended pending resolution of environmental and wilderness issues, and the leases held by 5-M and S.H. West had been sent forward for cancellation for non-payment of rentals. In addition to these Federal leaseholds, the State of Utah owns about 48,000 acres of coal lands within the portion of the Monument that has been classified as the Kaiparowits Plateau KRCRA.

The Pacificorp lease was suspended because of uncertainties associated with the Utah BLM Wilderness review, and the Andalex Resources leases were suspended pending completion of an Environmental Impact Statement on a mining proposal submitted by Andalex. Pacificorp has recently entered into an agreement with the Department of the Interior to relinquish its lease within the Monument. If Pacificorp and the Department can reach agreement on the fair market value of the lease, Pacificorp may obtain bidding credits equal to the fair market value that can be used to obtain another mineral lease. The process for determining the fair market value of Pacificorp's Kaiparowits lease is presently moving forward. Andalex is also involved in discussions with the Department to develop a process through which the value of their coal lease interests can be established. 5-M submitted an application to have their leases suspended which was rejected by BLM. Pending their appeal, 5-M's leases terminating for failure to meet the diligent development requirements of the Mineral Leasing Act of 1920 as amended. The S.H. West lease will terminate for failure to achieve diligence on September 1, 1997.

Figure 1: Federal Coal Leases in the Grand Staircase-Escalante National Monument



Grand Staircase-Escalante National Monument Vicinity

Explanation	
	Federal Lands (BLM)
	State
	Private
	National Forest
	National Parks/Recreation Areas
	Indian Reservation
	Known Recoverable Coal Resource Area (KRCRA)
	Leases
	State Sub-surface Minerals Only
	Monument Boundary



The purpose of this report is to summarize the coal resources within the Grand Staircase - Escalante National Monument, provide an initial assessment of the development potential of the coal, and present recommendations on further analysis needed to determine the value of the valid existing rights held on coal resources contained within the Monument.

Geologic Setting of the Coal Resources

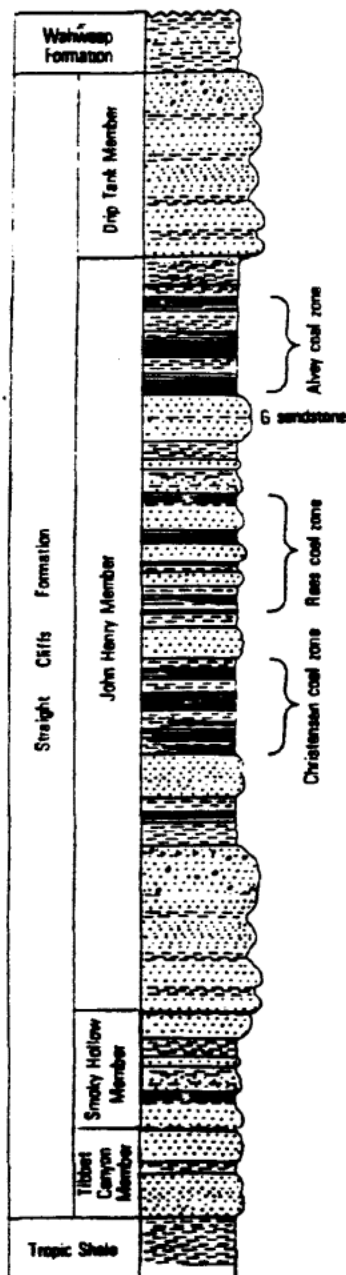
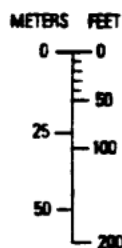


Figure 2: Representative Upper Cretaceous Stratigraphy, Kaiparowits Plateau (from Bowers, 1978)

The USGS provides a comprehensive discussion of the geology and depositional environment of the Kaiparowits area in their recently released report on the Kaiparowits Coal Field (Hettinger, 1996). In this report, these items will only be addressed in general terms. A section showing the stratigraphy of the coal lands within the Grand Staircase - Escalante National Monument is shown on figure 2, and the generalized geology of the area is shown on figure 3. Coal beds occur within the John Henry member of the Cretaceous Straight Cliffs formation which is equivalent to the Middle member designation used by earlier workers in the area.

The geologic structure of the Kaiparowits Plateau is relatively simple with numerous, northerly trending gentle folds plunging into a deep central basin (figure 4). Generally, strata within the plateau dip less than 6 degrees with local areas of steeper dips occurring on the limbs of some of the structural features shown on figure 4. No major faulting has been noted in the area of the known coal deposits and known faulting is limited to a few minor faults.

In addition to the Kaiparowits Plateau Coal Field, the Monument contains some coal resources in the Eastern portion of the Alton - Kanab Coal Field as is shown on figure 1. The coal resources in this coal



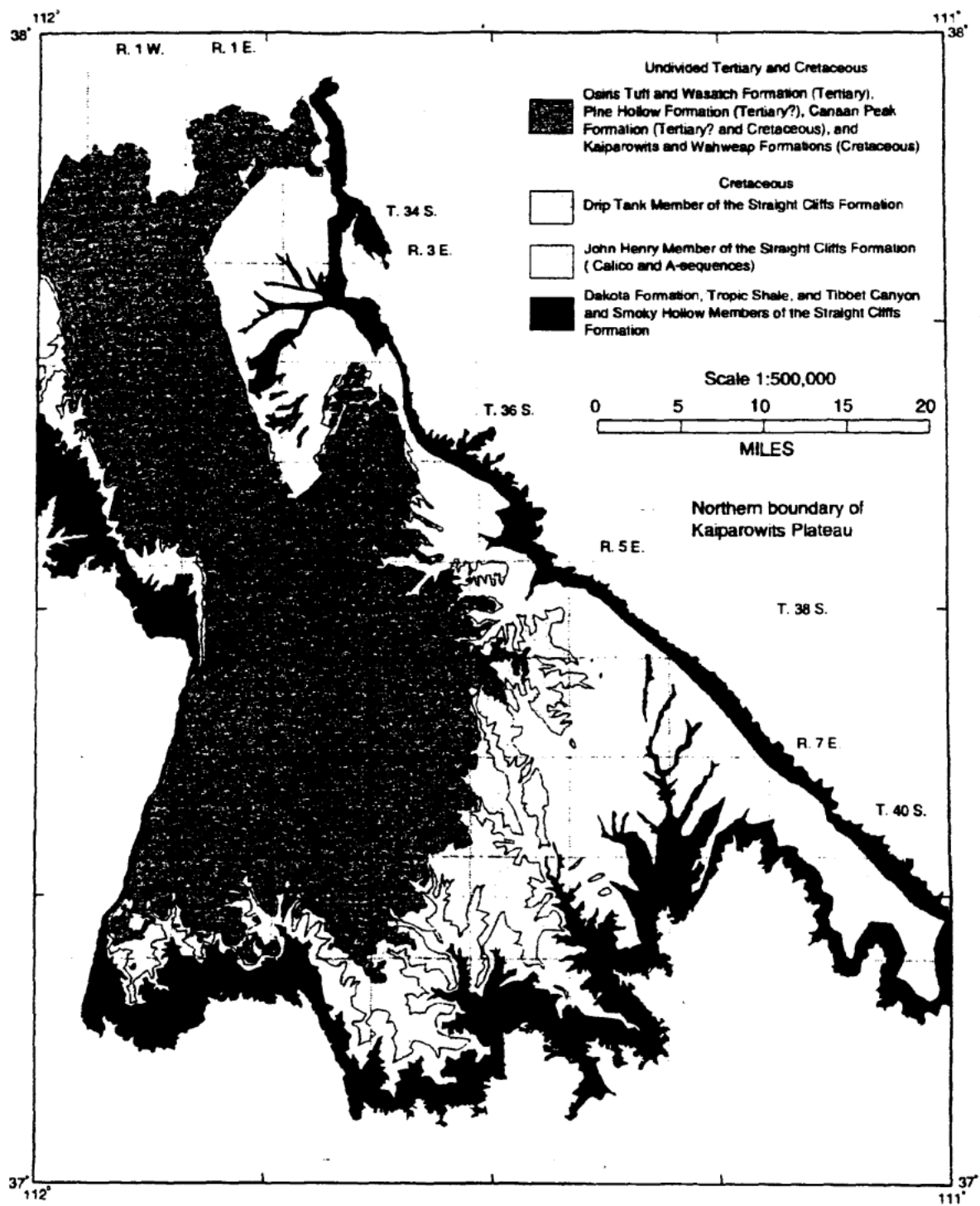


Figure 3: Generalized Geologic Map of the Kaiparowits Plateau (from Hettinger, et al., 1996)

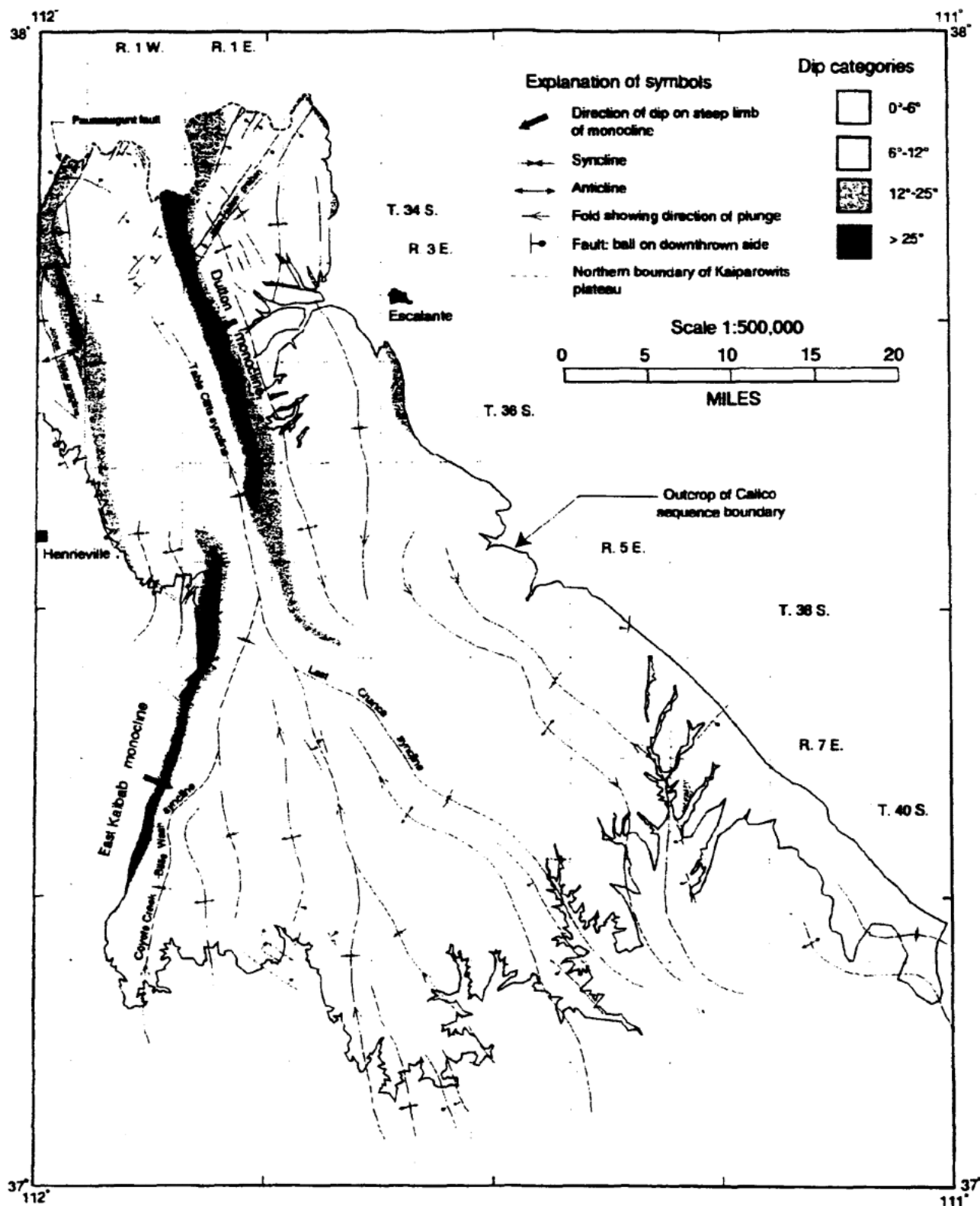


Figure 4: Major Structural Features of the Kaiparowits Plateau (from Hettinger, et al., 1996)

field occur in the Cretaceous Dakota Sandstone. These resources are generally lower in quality than the coal resources in the Straight Cliffs formation in the Kaiparowits Plateau. Much of the eastern portion of the Alton - Kanab coal field that is now within the Monument was declared as being unsuitable for further consideration for coal development by the Secretary of the Interior in 1979. Because these resources are of lower quality than Kaiparowits coals and were already unavailable for development when the Monument was established, their resource potential will not be discussed in this report.

Nature of the Coal Deposits

Kaiparowits coals are known to be very lenticular and discontinuous, and correlation of individual coal beds is very difficult. Most geologists who have attempted to define minable coal beds for potential mine blocks within the Plateau have determined that generally, a drill hole spacing of one-half mile or less is required to correlate individual coal beds with sufficient confidence to enable realistic mine plans and reserve base estimates to be developed. One consulting geologist working on the leasehold presently held by Andalex Resources provided the following observations on the difficulty encountered in correlating individual coal beds for mining. "Correlation of the coal beds in this area is difficult because [of]: (a)... the lack of a readily identifiable horizon within or delimiting the Middle, coal-bearing member of the Kaiparowits (Straight Cliffs) formation; (b) ... intimate intertonguing of coal and rock units; and (c) ... abundance of thin coals distributed throughout the Middle member. There are few places where the geologist can be confident of his correlations on drill spacing of more than one-half mile, and locally on closer spacing if the intertonguing is unusually complex, and there are numerous thin beds" (Johnson, 1972).

The coal resource classification system used by the USGS (Wood et al., 1983) provides that coal resources can be considered as "measured" if they are within a radius of one-fourth mile of a coal bed measurement. Using this standard, each drill hole would be surrounded by an area of a little over 125 acres that would be considered "measured". Defining measured reserves with this standard would require over 4 drill holes per section. The USGS recognized, however, that this "standard" may not be applicable in all areas, and provided flexibility in their classification system for a different drill hole spacing where geologic conditions warrant. For the Kaiparowits Plateau, geologists working on a property formerly held by El Paso Natural Gas Co. determined that due to the complexity of the coal geology on their leases, 8 drill holes per section would be needed to establish a "measured" reserve base. According to this standard, almost twice as much drilling would be required to adequately correlate coal beds and develop mining plans for a bed than is normally expected for most coal areas. Due to the complexity of the geology, only part of the Kaiparowits Coal Field has been explored sufficiently to enable correlation of individual coal beds. Consequently, most attempts to estimate the coal resources for the Kaiparowits Plateau have been based on coal zones or total thickness of all coal beds rather than individual beds. Although these estimates are reasonable representations of the magnitude of the in-place coal resource, they are not representative of the coal resource that is potentially minable and cannot be used to directly develop a credible reserve base estimate.

Coal Quality

In assessing the development potential of a coal deposit consideration must also be given to the quality of the coal. Of particular interest are those quality factors that affect the utilization characteristics of the coal such as heating value (Btu/lb.) and the composition of the coal in terms of moisture, ash, fixed carbon, and volatile material. These factors are used to determine the rank of the coal. In today's coal market, much attention is also given to the amount of sulfur dioxide (SO₂) released in burning the coal which is measured as pounds SO₂ per million Btu. For electric utilities which provide most of the present market for Utah coal, current clean air restrictions have established a compliance standard of 1.2 pounds SO₂ per million Btu. Utility customers burning coal with more than 1.2 pounds of SO₂ have to equip their boilers with scrubbers to reduce the SO₂ emissions or purchase emissions credits, thereby increasing their costs. Much of the present and future market potential for coal producers in the Western U.S. is dependent on the ability to produce low-sulfur compliance coal.

Table 1 shows the average quality for Kaiparowits Plateau summarized from 637 analyses taken from drill hole cores from coal lands within the Monument. All available as-received analyses from each drill hole were averaged except for coal beds with > 18% ash. The high-ash analyses were not used because they were considered to contain rock partings and were not representative of the coal. No attempt was made to weight the samples based on bed thickness or other criteria.

Table 1: Average Coal Quality Within the Grand Staircase - Escalante National Monument on an As-received Basis

Area	Number of Samples	% Moisture	% Ash	% Sulfur	Btu per Pound	Pounds SO ₂ per million Btu
North (T36-38S)	258	14.75	9.59	0.81	10,102	1.65
South (T39-41S)	379	7.78	9.05	0.59	11,469	1.03
Combined	637	10.61	9.27	0.68	10,916	1.28

Source: BLM Confidential Data Files, Salt Lake City, Utah

These data suggest that there is a significant difference between coal beds in the northern and southern part of the Kaiparowits Plateau coal field. The average values for the total coal field are somewhat skewed because more samples were used from the better coal area in the southern part of the field where the drill-hole density is greater. However, the results for the north and

south areas are reasonably representative. Coal beds in the north are higher in moisture and sulfur, have a lower heating value, and may be lower rank coals (Subbituminous A vs. High-volatile C Bituminous Coal). A map showing the distribution of coal quality based on the average pounds of SO_2 per million Btu is shown on figure 5.

Figure 5 Contains Proprietary Data and has been removed

This map shows that the Kaiparowits coal field is divided into two areas on the basis of quality. The coals to the north and east appear on the basis of these analyses to be non-compliance coal (> 1.2 pounds SO_2 per million Btu). Similar trends were noted for Btu and moisture. While the overall averages suggest that Kaiparowits coal may not be viable in today's coal market, the values from the southern area appear roughly equivalent to coals presently being mined in the Southern Wasatch Plateau coals, ~~presently being marketed~~. However, most Utah coal presently being mined exhibits better quality than the best coal from the Kaiparowits Plateau.

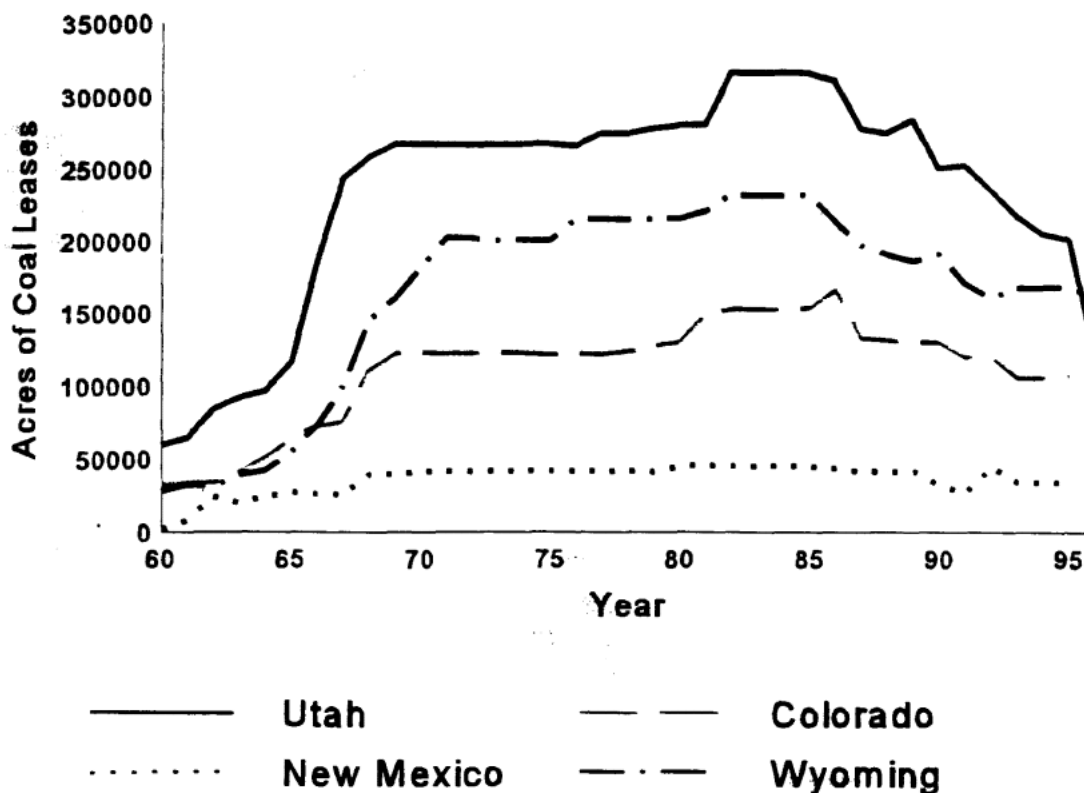
History of Coal Exploration and Mining

The coal deposits of the Kaiparowits Plateau were first developed by early settlers for local use. Mining to serve these local needs persisted on a small scale from the late 1800's to the early 1960's. A number of small mines were developed, most of which produced only a few hundred tons per year. In the early 1960's, the local coal market disappeared resulting in abandonment or closure of the existing small mines.

During the mid-1960's through the early 1970's, interest in Western United States coals increased because of expectations of increased demand for low-sulfur coal and projections of significant increased demand for energy. This resulted in a drastic increase in the acreage of Federal coal leases held by industry in all western states with significant coal resources. Figure 6 shows the

Figure 6: Federal Coal Leases

1960 through 1996

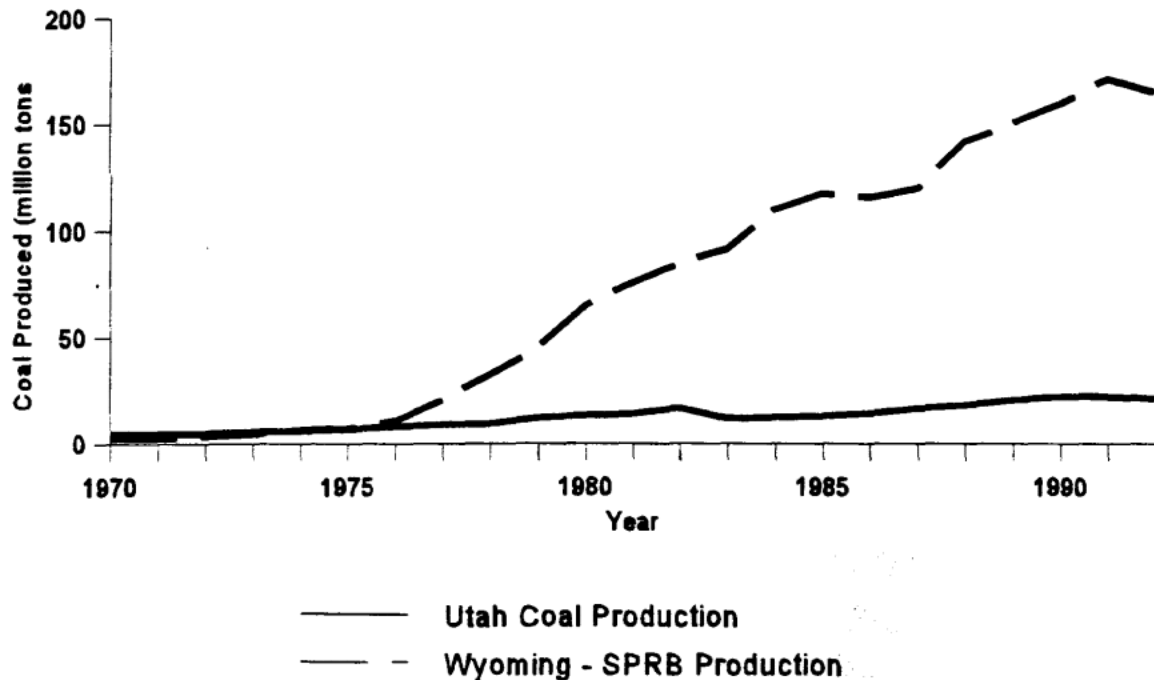


acres of Federal coal leases in the major Western coal states from 1960 through 1996. Most of the acreage increase in Utah was due to leasing activities in the Kaiparowits Plateau. The increase in the acres of coal leases between 1960 and 1970 was not accompanied by a commensurate increase in coal production which raised concerns about speculation in the Federal coal program. In 1970, the Secretary of the Interior declared a moratorium on issuance of new Federal coal leases. By 1976, Congress passed the Federal Coal Leasing Amendment Act (FCLAA) which eliminated non-competitive leasing for Federal coal and provided that lessees must diligently develop their leases. Through rule-making, the Department of the Interior determined that in order to diligently develop a coal lease, lessees would have to produce one percent of the reserves held in the lease within ten years. As a matter of policy, for diligence purposes, the Department determined that market considerations would not be considered in establishing reserves on a lease. When coal leasing resumed in the early 1980's, some of the robust projections of demand for energy had not materialized, and many coal leases began to be canceled as the lease holders were not able to meet the diligence requirements

brought in by FCLAA.

As is shown on Figure 6, coal leasing activity for Utah and Wyoming followed a similar trend until about 1996 when, under the provisions of FCLAA, non-producing coal leases would be cancelled. By the end of 1996, the Utah lease acreage drops off sharply, while the Wyoming acreage actually increases slightly. Much of the coal lease acreage added between 1960 and 1970 in Utah was in Southwest Utah, including the Kaiparowits Plateau, and much of the

Figure 7: Coal Production 1970-1992
Utah and S. Powder River Basin, Wyoming



Wyoming increase was from new leases in the Southern Powder River Basin. A comparison of Utah and Southern Powder River Basin coal production from 1970 to the present is shown on figure 7. It appears that difference between the lease acreage curves for Utah and Wyoming

may be due in part to coal producers being successful in developing mines in the Powder River Basin to take care of much of the new demand that fueled the leasing increase of the 1960's. At the same time, due to higher mining costs (underground versus surface) and lack of infrastructure and transportation facilities which limited markets, no mines were developed in the Kaiparowits Plateau. Some of the mine plans submitted for Federal coal leaseholds in the Kaiparowits Plateau identified potential markets in the Midwest and Southeast United States that are presently using Wyoming Powder River Basin coal.

Because of the isolated nature of the Kaiparowits Field and lack of transportation facilities, developing potential markets for Kaiparowits coal required some non-traditional approaches. The first efforts to develop large-scale mining operations in the Kaiparowits were linked to mine-mouth coal fired electric generating facilities. In the early 1970's, the Resources Consortium (Southern California Edison, Arizona Public Services, San Diego Gas & Electric) proposed a plant that would burn up to 12 million tons annually. A final Environmental Impact Statement was published in 1976 but the companies withdrew the proposal before the Secretary of Interior rendered a decision on the project. Another 1500 to 2000 megawatt facility was discussed in the 1970's by Utah Power & Light Co. south of Escalante, Utah utilizing coal (5-6 million tons annually) from their property near the plant site. The proposal never reached the environmental consideration stage and the company concentrated efforts on Central Utah coal-fired power generation.

In the late 1970's, the preliminary feasibility of mine-mouth synthetic fuel conversion was considered as a market source for Kaiparowits coal. Additional creative approaches were attempted to overcome the transportation disadvantage of Kaiparowits coal by evaluating the feasibility of building a railroad or coal slurry pipeline to transport the coal. The challenges of difficult terrain, high development costs, uncertain coal markets, and the slowing in electrical demand through conservation measures resulted in none of these proposals being developed.

The Arab oil embargo which led to the "Energy Crisis" in the 1970's contributed to the high interest for domestic development of untapped energy reserves like the Kaiparowits Coalfield. New potential coal markets such as the conversion of oil and gas fired electric plants in the Southwest U.S. were thought to be huge new markets for this coal. As the embargo was lifted and the projected \$50 to \$60 per barrel oil price disappeared, this coal market vanished.

A map showing the lands in the Kaiparowits Plateau that were held at one time under Federal permit or lease and the extent of exploratory drilling is shown on figure 8. It is clear by the amount of exploratory drilling, that a number of companies were serious in their intent to mine Kaiparowits coal. Much of the area that appears to have potential for minable compliance coal has been drilled out sufficiently to enable mine blocks to be defined. However, the companies were unable to put an economically viable project together, and either sold or lost their leases. Figure 9 shows the major coal lease holdings in the Kaiparowits Plateau identified by company. A brief summary of the major companies active in the Kaiparowits Plateau and the disposition of their interests is shown below on table 2.

Figure 8: Historical Coal Exploration and Leasing Activities in the Kaiparowits Plateau

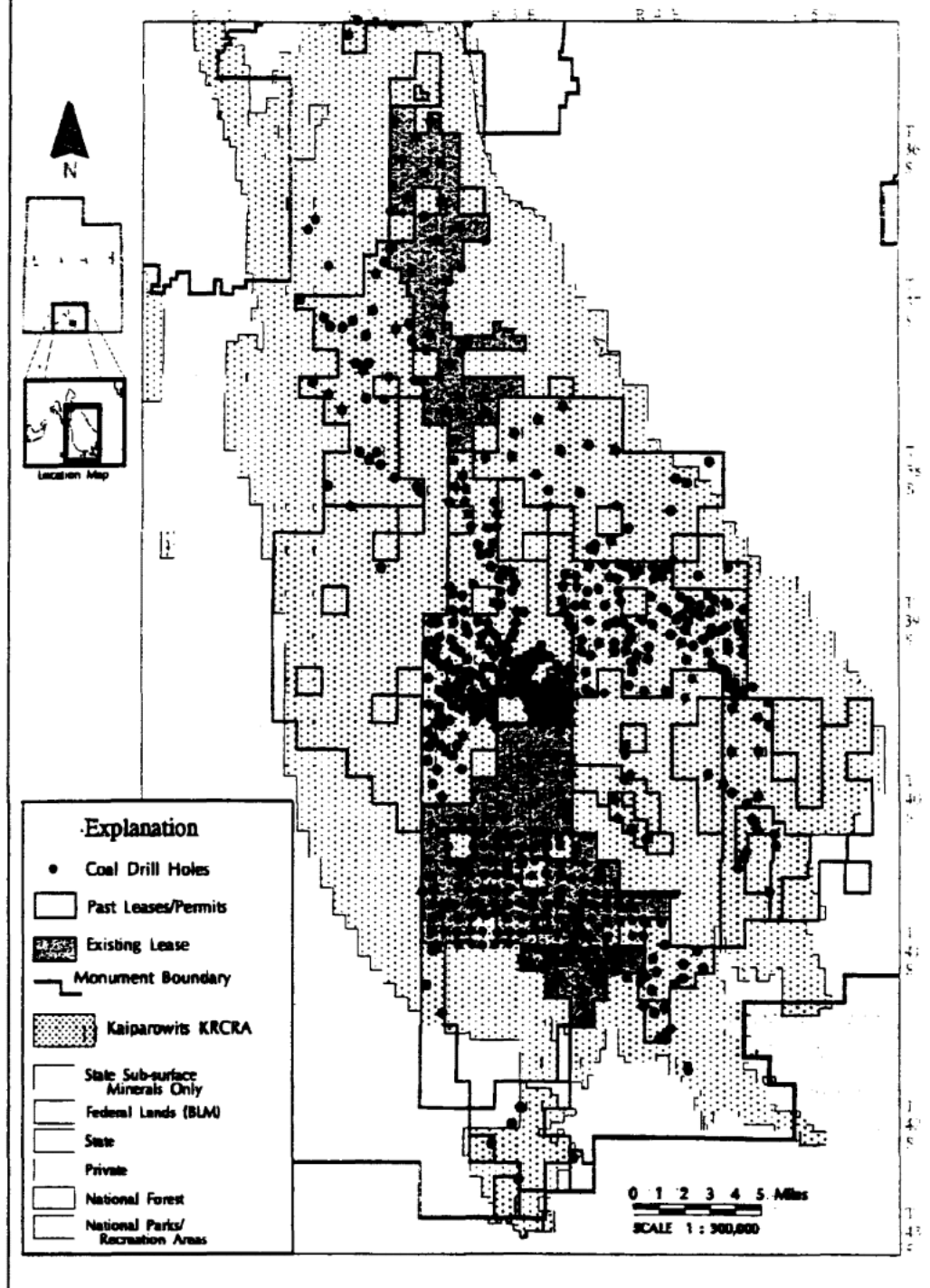


Figure 9: Coal Properties held by Major Companies in the Kaiparowits Plateau
(Past & Present)

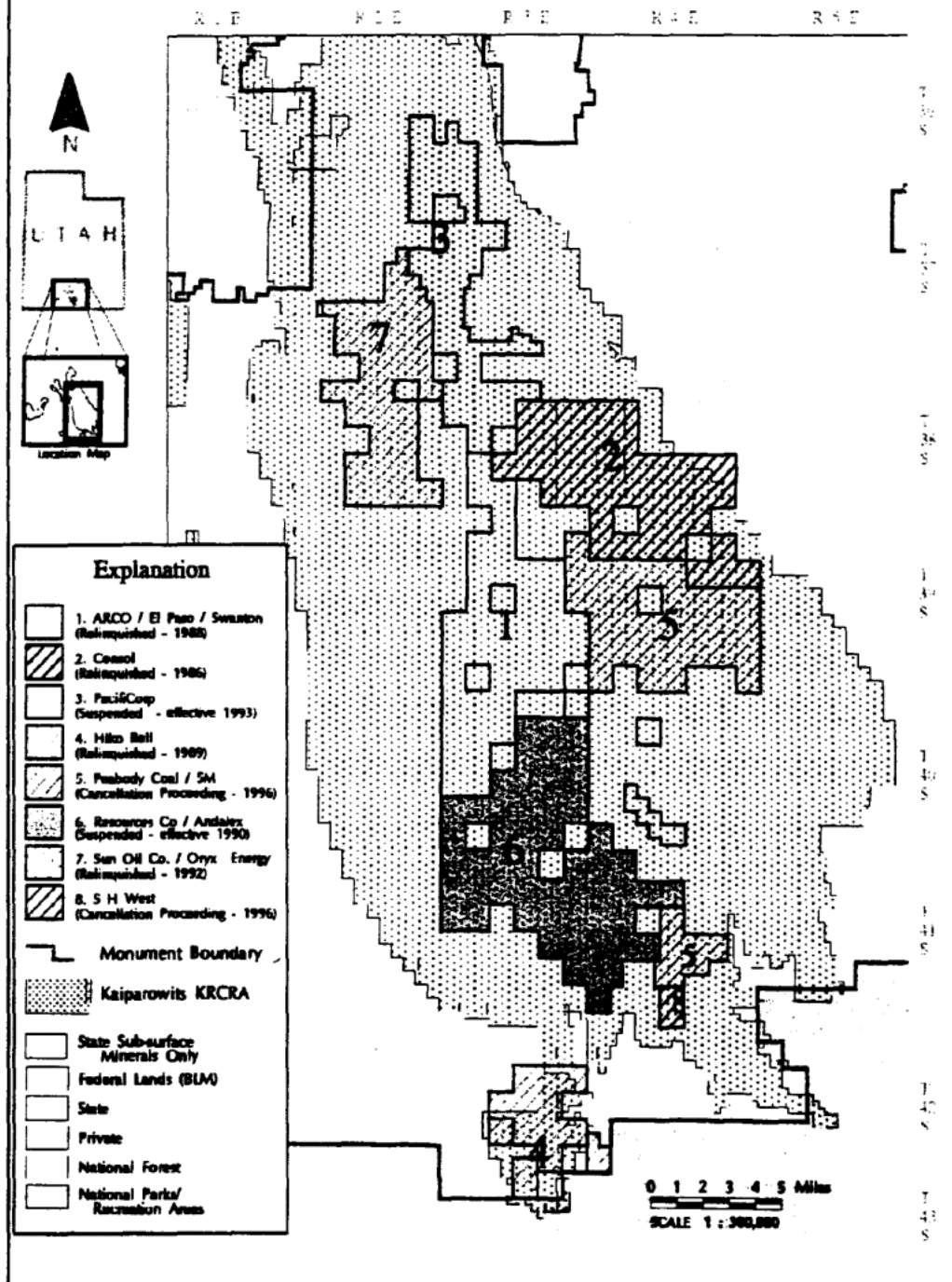


Table 2: History Summary of Major Coal Leaseholds in the Kaiparowits Plateau

Block	Type *	Size	Principal Owner	History	Disposition of Federal Leases
1	PRL	25,738.72 Fed 14,163.72 State	ARCO/ El Paso	1964 to 68 - Original PR Leases 1971 - Assigned to El Paso 1984 - Leases assigned to Swanton Energy 1988 - Swanton Bankrupt, 3 leases terminated for failure to meet diligent development others relinquished.	Leases Terminated or Relinquished
2	PRL	25,533.41 Fed	Consol	1967 - Original Leases	Relinquished by Consol
3	PP/PRL	18,325.00 Fed 3,200.00 State	Utah Power and Light Co./ Pacificorp	1967 - Prospecting Permits 1977 - Permits Assigned To Utah Power and Light Co. (Pacificorp) 1980 - Utah Power attempted to exchange PRLA's for Leases in Wasatch Plateau, no exchange. 1982 - Lease Issued 1991 - Lease suspended eff. 11/83 1996 - Agreement with DOI for possible bidding rights exchange	Suspended Exchange presently being evaluated
4	PRL	8,758.67 Fed 1,280.00 State	Hiko Bell	1965 - PRL Issued 1989 - Leases relinquished	Relinquished
5	PRL	28,084.72 Fed 1,280.72 State	Peabody Coal Co.	1967 - PRL Issued 1986 - Assigned to 5-M 1995 - BLM initiated action to cancel for non-payment of rentals 1997 - 5-M filed for suspension, BLM denies suspension	9 of 12 Leases Terminated Pending Appeal Others will terminate by 11/97
6	PRL	39,355.19 Fed 6,210.44 State	Resources Company	1965 to 67 - PRL Issued 1986 - Assigned to Andalex 1991 - Mine Permit filed. 1992 - Leases suspended eff. 9/10/90 for EIS on permit	Suspended Negotiating Possible Exchange
7	PP	21,711.00 Fed 4,511.60 State	Sun Oil Co./ Oryx Energy	1968 - PP Issued 1973 - PRLA filed 1995 - PRLA relinquished	Relinquished
8	PRL	964.88 Fed	S.H. West	1967 - PRL Issued 1994 - BLM initiated action to cancel for non-payment of rentals	Pending Cancellation

* PRL = Preference Right Lease PRLA = Preference Right Lease Application PP = Prospecting Permit

Coal Resources

As was discussed above, it is difficult to make a realistic projection of the development potential of the coal resources in the Grand Staircase - Escalante National Monument because of the complex depositional environment of the coal beds. Coal mines are developed on coal beds, not zones, and for proper mine planning, and to be able to determine the costs associated with developing a coal deposit, one must be able to project a mine on specific, correlatable coal beds. Because of the complexity of the Kaiparowits coal deposits, most previous estimates have been either by coal zone, or by estimating the total resource. In October, 1996, the USGS released a report that estimated a total in-place coal resource for the Kaiparowits Plateau coal field of 62.3 billion tons (Hettinger, et al., 1996). This estimate included all coal beds at least 1 foot thick with no consideration given for correlation of individual coal beds, minimum thickness for mining, maximum thickness that can be mined with current technology, interburden thickness between beds that could be mined, and overburden. Although sufficient data exist over much of the area of potentially minable coal deposits within the monument to develop a reasonable reserve base estimate for areas with adequate data, the development of an estimate of a bed-specific minable coal reserve base is beyond the scope of this report. However, the gross resource estimate provided by the USGS can be used as a basis for identifying the order of magnitude to the expected recoverable coal resources contained in the Monument, by discounting their in-place resource estimate by appropriate factors to consider the mining issues discussed above.

The first and most obvious discount factor to apply is the fact that the USGS estimate of 62.3 billion tons included the entire Kaiparowits Plateau Coal Field, and included lands outside of the Monument. Using the USGS estimates as reported for each individual township, it appears that only about 44.2 billion tons of their estimated 62.3 billion tons is within the Monument.

In order to better define the coal reserve base within the Monument, the resource estimate developed by USGS must be further reduced by eliminating coal that is too deep to mine using present technology. Currently, mines in Central Utah encounter mining problems when the overburden exceeds 2000 feet. Using the estimates developed by the USGS, it appears that approximately 30.2 billion tons of the coal resource contained within the Monument occurs at overburden depths of 2000 feet or less. Most (about 12 billion tons) of the remaining 14 billion tons in the Monument occurs at a depth of 2000 to 3000 feet.

In order to be considered as a reserve, coal resources must be marketable. As was discussed above, the present market for Western coals is for low-sulfur coals that are capable of meeting the 1.2 pounds SO₂ per million Btu requirement for compliance with Clean Air Act restrictions. If the reserve base for Kaiparowits coals is limited to those areas appearing to contain compliance coal, only about 11.5 billion tons of the remaining USGS resource estimate would be considered potentially developable on the basis of present market quality restrictions. To derive this number, coal resources that appeared to be non-compliance coal based on our quality assessment as shown on figure 5 were eliminated from the reserve base.

Kaiparowits coals are characterized by numerous, lenticular coal beds that may or may not be continuous for mining. Many of the coal beds lack sufficient interburden (thickness of rock between beds) to enable all beds to be mined. Furthermore, many beds contain areas where the coal is much thicker than can be mined using present technology. A number of drill holes in the southern portion of the Kaiparowits Plateau were examined in an effort to determine which beds and how much of each bed could be mined given consideration to a minimum interburden thickness of 50 feet between beds, a minimum mine height of 6 feet, and a maximum mine height of 13 feet. Through this evaluation, we determined that, on average, less than 30 per cent of the total in-place resource could be mined in the stratigraphic section represented by these drill holes. Applying a 30% discount factor to the remaining 11.5 billion tons from the original USGS resource estimate would leave less than approximately 3.5 billion tons of coal that could be considered minable. At present, experience in underground mining in the United States suggests that an overall recovery of 60 to 70 per cent is reasonable to expect in the minable portions of the Kaiparowits Plateau. Using a 70 per cent recovery factor, the potential recoverable resources of low-sulfur compliance coal would be about 2.4 billion tons. Using the same criteria, an additional 3.9 billion tons of non-compliance coal resource may be potentially recoverable from the Monument for a total recoverable resource on the order of 6.3 billion tons. While these estimates are rough and based on a number of assumptions, they are reflective of the order of magnitude of potentially recoverable coal resources that might be contained in the Monument and clearly shows the problems inherent in attempting to base an economic value on gross resource estimates.

Coal Development Potential

In assessing the development potential of any area, one basic fact must be kept in mind. Coal in and of itself does not have an intrinsic value. Without a market for the coal and the ability to mine and deliver the coal to that market at a competitive price with a reasonable profit, the coal resource has no present economic value and any value ascribed to such a coal property would be speculative in nature. In order to assess the development potential of a particular coal deposit, consideration must be given both to the physical factors that establish the minability of a deposit and the economic factors which enable the coal resource to be exploited. This is recognized by the USGS who define reserves as that part of the coal resource "which could be economically extracted or produced at the time of determination considering environmental, legal, and technologic constraints". It follows that the portion of a coal deposit that can be classified as a reserve would have the highest development potential. In order to be classified as a reserve, as defined by the USGS, the coal resource would have to meet the quality standards identified in present markets, be able to be mined under present technologic constraints, and be able to be delivered to the market at a competitive price. Areas that cannot be classified as a reserve because of poor quality, adverse mining conditions, lack of markets or transportation, or inadequate definition of the resource, would be considered to have lower development potential. Before the coal resources in the Monument can be considered as a reserve, they must meet the quality specifications of the present market, be adequately defined to assess the minability of the deposit, and be able to be profitably delivered to the market at a competitive price.

At present, over 70% of Utah's coal production is used to generate electricity in Utah and other States. If exports are included, over 88% of Utah's coal production goes to electric utilities (Jahanbani, 1996, p. 5). Utah is able to maintain a share of this market because of the ability of Utah coal producers to produce a bituminous, low-sulfur product to those electric utilities to which Utah has a transportation advantage over other producers. Coal production projections by Resource Data International (RDI) project that Utah coal production will continue to increase over the next 15 to 20 years with most of the production going to domestic and export electric utilities (RDI, 1996, p. 2-113). Between 1996 and 2010, RDI projects that essentially all Utah utility coal shipments will be compliance coal with less than 1.2 pounds SO₂ per million Btu (RDI, 1996, p. 2-115). In a coal supply and demand study for the Kaiparowits Plateau prepared for the Bureau of Land Management, BXG (BXG, 1997) also showed an overall increase in Utah coal production, but their projection was somewhat less optimistic than RDI. For example, RDI projects that Utah annual coal production will exceed 50 million tons by 2010, while BXG forecasts a production level of 33 million tons annually by 2010. The BXG production levels considers the production capacity of existing and planned mines, and is probably more realistic than the RDI forecast. However, both of these projections show that through the time covered by their forecasts, the potential markets for Utah coal will be from areas that can produce a compliance coal product. In fact, RDI projects that after 2000, no Utah utility coal shipments will be greater than 1.2 pounds SO₂ per million Btu (RDI, 1996, p. 2-115).

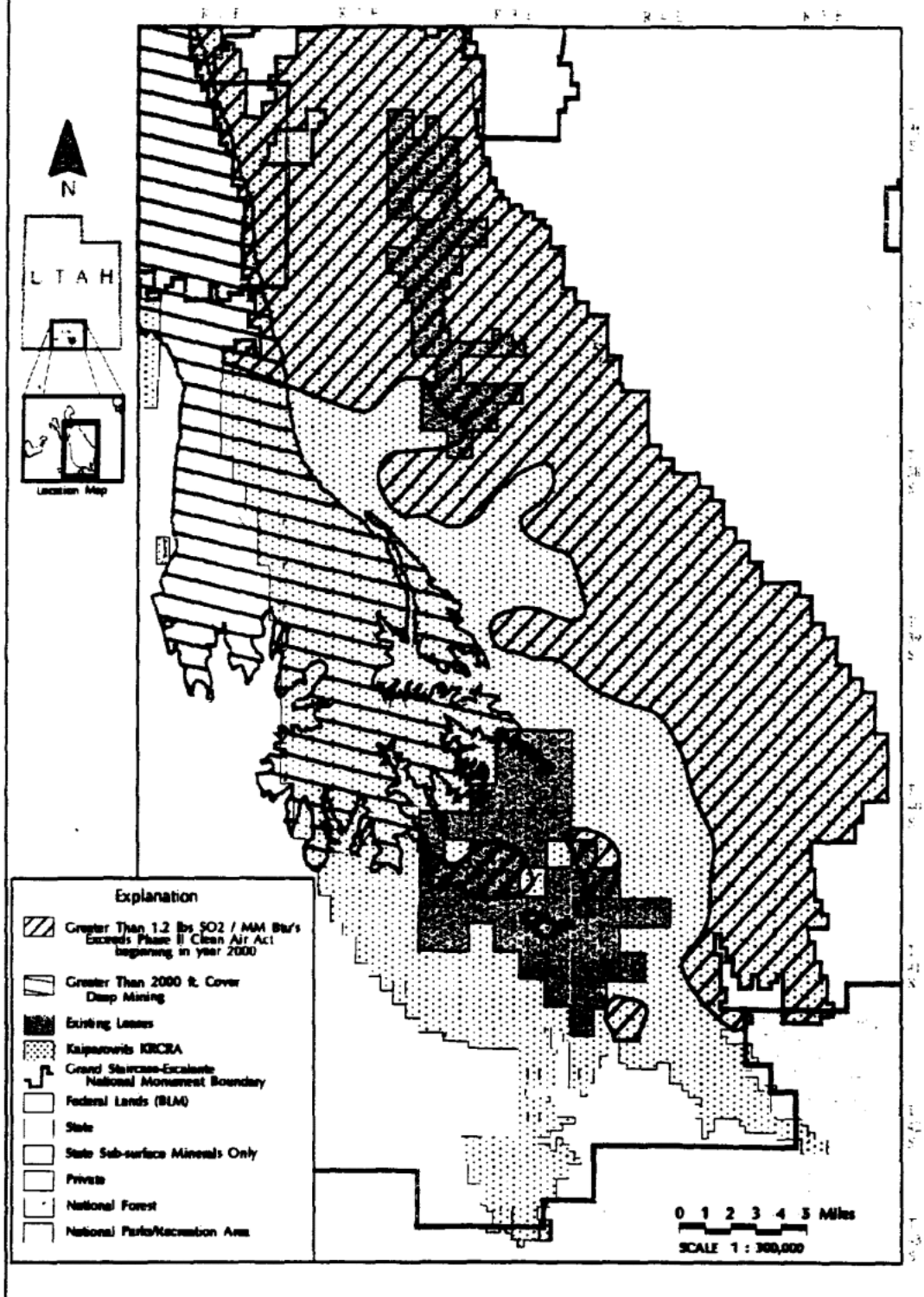
Exploration in the Kaiparowits Plateau coal field has shown that the complexity of the geologic setting of the coal deposits requires that an area generally must be drilled on at least one-half mile drill-hole spacing in order to adequately correlate individual coal beds for mining purposes. This will further limit any reliable reserve estimates to those areas with adequate drilling. Without the ability to demonstrate the continuity of a single coal bed and identify the mining characteristics of this bed with regards to adjacent coal beds, mine plans and projections cannot be developed with sufficient confidence to enable mining costs to be projected without applying a high risk factor. As was shown on figure 8, some areas of the Kaiparowits Plateau appear to have adequate drilling to enable minable coal beds to be identified. However, a large portion of the Known Recoverable Coal Resource Area in the Monument will require additional drilling before bed-specific reserve base estimates can be made and the development potential of the coal can be assessed.

The principal market for Utah coal is for generation of electricity, and transportation costs contribute a disproportionate share of the costs associated with using coal as an energy resource. RDI states that the transportation component constitutes about one-third of the fuel costs at power plants (RDI, 1996, p. 1-77). At plants dependent on rail delivery of Western coal, transportation can comprise half of the cost to produce electricity. Electrical utilities that burn coal are largely dependent on rail transport to deliver coal to the plant, and almost 60% of the nation's coal-fired power plants are served exclusively by rail (RDI, 1996, p. 1-76). The dependence of the coal industry's main customers on railroad transportation puts those coal resources remote from existing railroad facilities at a disadvantage. The coal resources of the Kaiparowits Plateau have remained undeveloped primarily due to the lack of a way to transport

the coal to existing markets at a competitive price. In their 1982 analysis of the development potential of Federal coal leases, the Office of Technology Assessment stated that Union Pacific Railroad had determined that a production level of 30 million tons per year would be required from the Kaiparowits Plateau to justify the expense of constructing a rail line into the area (OTA, 1982, p. 22). This production level represents essentially all present Utah production. It appears, therefore, that the transportation disadvantage held by Kaiparowits coal will continue until the demand for Utah coal increases to a level high enough to justify construction of rail facilities. As long as there are coal reserves in Central Utah near existing rail transportation sufficient to meet projected market demands, Kaiparowits Coal will continue to be unable to compete in the marketplace. The remoteness of the Kaiparowits Plateau and lack of an adequate transportation infrastructure contribute to making most of the coal resources in the Kaiparowits Plateau uneconomic at the present time. BXG has determined that the present disadvantage of Kaiparowits coal with respect to transportation and coal quality will keep it out of the current spot and term contract market (BXG, 1997, p. 3). BXG further projects that the earliest window of opportunity for development of Kaiparowits coal will occur as present production from Central Utah begins to decline after 2015 (BXG, 1997, p. 5). Development of any coal resources from the Kaiparowits Plateau before that time will be a difficult, if not impossible, proposition. At that time, Kaiparowits coal may have an opportunity to gain a position in the coal market only if it can be competitive with other coal from Colorado, Southern Wyoming, or Wyoming's Powder River Basin.

Although market considerations suggest that the present development potential of all coal in the Kaiparowits Plateau is low, the relative development potential can also be defined on the basis of the physical characteristics of the coal resources. Figure 10 shows the main part of the Kaiparowits Coal Field in the central part of the Monument, along with the areas considered to have non-compliance coal and the overburden lines showing areas where the coal resource is expected to be deeper than 2000 feet. The areas within the Known Recoverable Coal Resource Area with non-compliance coal or overburden greater than 2000 feet would have a relatively lower development potential than other coal lands within the Monument. In a relative sense, the higher coal development potential for coal resources in the Monument would be found in those areas that are adequately explored, are expected to contain less than 1.2 pounds SO₂ per million Btu, that have overburden of less than 2000 feet, and are close to existing transportation facilities.

Figure 10: Coal Development Potential
in the Kaiparowits Plateau



When the Grand Staircase - Escalante National Monument was created, the proclamation establishing the Monument recognized that designation of the Monument would be subject to valid existing rights. Consequently, any entities holding a valid coal lease in the Monument should be able to develop their lease in accordance with the terms of their lease and existing laws and regulations. In addition, owners of non-federal coal rights, such as the State of Utah, should also have the right to develop their interests. The value of the coal interests in the Monument is dependent on amount of the coal resources present, how well those resources are defined, and their development potential as determined by coal quality, access, anticipated markets, and timing for development. Because the proclamation establishing the Monument withdrew the lands from any further coal leasing, the only areas of Federal Coal with any development potential would be associated with the valid coal leases existing at the time the Monument was established. For the Federal coal, that would appear to be limited to the leases held by PacifiCorp and Andalex.

The Federal coal leaseholds in the Monument are all subject to the diligence provisions established by FCLAA. By regulation, the Department of the Interior has determined that unless a lessee produces one per cent of the "recoverable reserves" on the lease within 10 years, the lease will not meet diligence and will terminate. For diligence purposes, BLM does not consider economics or transportation facilities in establishing "recoverable reserves". The diligence development requirements for the Federal coal leases with a potential for being considered for development right is shown in Table 3.

When determining the value of these leases which might be considered as having potential for development, consideration should be given to the following:

1. The quantity of the coal resources present in the lease,
2. The degree to which these resources are defined,
3. The quality of the coal resource,
4. The minability of the coal,
5. The existence of a market for the coal likely to be produced,
6. The availability of transportation facilities to move the coal to this market, and
7. Whether the diligent development provisions of the lease could be met.

Problems with any of these criteria would reduce the development potential of the coal lease being evaluated.

Table 3: Status of Federal Coal Leases in the Grand Staircase - Escalante National Monument

Lease No.	Lessee	Size (acres)	Date Issued	Diligence Production Requirement	Time Remaining to Achieve Diligence *
U-1362	Pacificorp	18,325.16	02/01/82	5,000,000	8
U-087805	Andalex	2,064.44	11/01/65	566,000	5
U-087806	Andalex	1,945.32	11/01/65	225,000	5
U-087807	Andalex	1,920.00	11/01/65	608,000	5
U-087828	Andalex	2,560.00	11/01/65	453,000	5
U-087833	Andalex	2,517.68	11/01/65	769,000	5
U-087834	Andalex	2,560.00	11/01/65	323,000	5
U-087835	Andalex	1,920.00	11/01/65	615,000	5
U-087836	Andalex	640.00	11/01/65	193,000	5
U-092139	Andalex	1,934.73	11/01/65	125,000	5
U-092140	Andalex	2,022.48	11/01/65	443,000	5
U-092141	Andalex	1,972.16	11/01/65	287,000	5
U-096486	Andalex	640.00	11/01/65	229,000	5
U-096494	Andalex	2,560.00	11/01/65	825,000	5
U-096495	Andalex	2,559.84	11/01/65	401,000	5
U-096496	Andalex	2,560.00	11/01/65	621,000	5
U-096497	Andalex	2,560.00	11/01/65	695,000	5
U-0101142	Andalex	1,562.08	04/01/62	230,000	5

* After Suspension is lifted and beneficial use of the lease resumes

The State of Utah coal lands, scattered throughout the Monument, do not have the limiting

factors associated with the diligent development terms of Federal coal leases, so a speculative value could be ascribed to them. However, the State lands with the highest development potential would be those associated with the better defined high quality resources. State lands which appear to contain only non-compliance coal would be considered to have a low development potential. To establish a value for any of the State coal lands, existing drilling information will have to be reviewed to correlate minable coal beds and establish a bed-specific reserve base from which reserves can be calculated.

Summary and Conclusion

The coal resources from the Kaiparowits Plateau Coal Field within the Grand Staircase - Escalante National Monument represent a significant undeveloped resource. With potential recoverable compliance coal resources on the order of 3 billion tons, the Monument contains much of the remaining low-sulfur, compliance coal in Utah. These resources have remained undeveloped due in large part to the remoteness of the area and the lack of suitable transportation facilities to deliver the coal to the market. The availability of better quality coal in Central Utah closer to transportation facilities has kept coal in the Kaiparowits Plateau from being developed, and market projections suggest that this will continue until at least 2015. By then, it is projected that much of the better coal resources in Central Utah could be depleted, and market demand could shift to more remote areas such as the Kaiparowits Plateau. By that time, the Federal leases in the Plateau could be terminated for failure to achieve diligence as required by the terms of the leases, so the demand will have to be met from elsewhere in Utah or other areas of the West. Coal lands held by the State of Utah within the monument are less likely to be developed when the market shifts because of their relative small size and scattered distribution throughout the area.

Any assessment of the fair market value of the Federal coal leases in the Grand Staircase - Escalante National Monument must consider the terms of the lease including requirements for diligent development. If it is unlikely that diligence could be achieved for a lease before the date specified in the lease, the value of the interest in that lease must be adjusted accordingly. In a market transaction, any buyer of such a property would reduce the price he would pay to reflect the risk involved in not being able to develop the lease in a timely manner. In essence, a Federal coal lease that will not achieve sufficient production before the failure to meet diligence causes the lease to terminate has little value.

Appraisal of the State coal lands within the monument is a different proposition. The State's interest in their coal lands is not constrained by development time frames like the Federal leases. The fair market value can be established for the State coal lands based on their speculative value sometime in the future. However, evaluation of the State coal lands must still consider the quality of the coal, the degree to which the resources are defined, the minability of the coal beds with respect to depth of cover, the continuity and minability of individual coal beds, and the likelihood and timing of development of the lands in conjunction with the adjacent Federal coal lands. Each State section must be evaluated individually on a case-by-case basis.

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